PROJECT MUSE®

7. The Morrill Land-Grant Act and American Cities: The Neglected Story

Published by

Seely, Bruce E., et al.
Science as Service: Establishing and Reformulating American Land-Grant Universities, 1865–1930.

The University of Alabama Press, 2015.
Project MUSE. https://muse.jhu.edu/book/41357.

For additional information about this book
https://muse.jhu.edu/book/41357

[140.254.77.253] Project MUSE (2025-03-29 22:39 GMT) The Ohio State University

7

The Morrill Land-Grant Act and American Cities

The Neglected Story

Robert B. Fairbanks

The land-grant universities of the later nineteenth and early twentieth centuries were agricultural and technical in character, but scientific in ethos. They attempted to apply science to whatever they encountered and dismissed things that failed to meet their template. One of their key thrusts has been to employ science to rearrange the material aspects of the social scene. Fairbanks's essay shows just how far-reaching that effort has been. He focuses on urban design and demonstrates that land-grant institutions, purportedly rural and agricultural, have been potent forces in the rise of cities and their services. Land-grant institutions have created generations of men and women who have run, administered, and designed cities. Without land-grant trained personnel and the application of science initiated at land-grant institutions, American municipalities would be far different places. Indeed, material transformations revealed and yielded new social arrangements.

⁂

Much has been written on the Morrill Land-Grant Act but little has appeared about its impact on urban America.[1] Not only have scholars demonstrated how it transformed the concept of higher education but they have also emphasized its contributions to practical education though its focus on agriculture and the mechanic arts in the United States.[2] Indeed, for one historian it proved "the most important piece of agricultural legislation in American history."[3] However, students of the Morrill Land Grant Act have

[140.254.77.253] Project MUSE (2025-03-29 22:39 GMT) The Ohio State University

shown little inclination to examine the role it played in meeting the needs of the rapidly expanding city, an omission that this chapter seeks to address.

The rise of the city in the second half of the nineteenth century was one of the most important developments in United States history. Scholars have given much attention to the political, social, and physical challenges such rapid growth created. Some have also emphasized how the changing definition of the city, from regulatory to service oriented, redefined the very responsibilities of local government regardless of city size.[4] Growing expectations from city residents of what municipal government could and should do also altered during this period and government implemented new initiatives to respond to the public outcry for more intervention in the physical needs of the city. While for a long time, urban historians focused on the political battles between bosses and reformers, more attention in recent years has been given to the role of experts in the governing of cities, professionals such as civil engineers and landscape architects. One historian wrote, "virtually the only problems successfully attacked by nineteenth-century urban leaders were susceptible to engineering expertise."[5]

The Morrill Land-Grant Act played a critical role in promoting the development of the type of technical expertise needed by the turn-of-the-century city. Although engineering, viewed as the professional phase of mechanic arts by the Land Grant College Engineering Association, focused on keeping up with developments in industry and commerce, it provided the foundation for several courses of study that would address the needs of rapidly expanding urban America.[6] Land-grant colleges played an important role in the development and advancement of three academic programs closely tied to the city: civil engineering (with an emphasis on municipal needs), planning, and architecture.

There were few engineering schools in the United States before the Civil War, but that changed after Congress passed the Morrill Land-Grant Act of 1862. Although the United States Military Academy at West Point offered a course of study in engineering before the war, it undertook such instruction primarily for military purposes. Nevertheless, by 1830 about 120 West Point graduates worked as civil engineers.[7] Other engineers had been educated in Europe, benefitted from an apprenticeship, or experienced some other on-the-job training. Although several colleges, including Harvard and Michigan, offered engineering programs by the 1850s, one scholar has concluded that at this time "academic engineering programs . . . remained on the periphery of the American educations scheme."[8]

According to one study of the training of engineers in the United States, "the Morrill Act opened the way for the rapid expansion of engineering education throughout the North and the West."[9] As we have seen, prior to 1862, most of those who became engineers had followed a non-academic route. But that started to change after the Civil War. A growing number of land-grant colleges started to offer formal training in engineering. Indeed, during the ten years after the passage of the Morrill Act, the number of American engineering programs grew from six to seventy. Cornell, New York's Morrill beneficiary, proved to be particularly influential, "both by direct example and through her many graduates who went out as organizers and teachers."[10] As early as 1872, fifty-four students had enrolled in its Civil Engineering Department. And by 1908, the number of its civil engineering students reached 569. That spectacular growth took place despite the rapid increase in engineering programs throughout the nation from 85 in 1880 to 220 in 1890.[11] Most of those graduates did not end up working for municipalities, but those who did made significant contributions to the expanding cities.

The considerable increase in engineering programs and the rapid growth of cities in the 1880s was not a coincidence. Not only did manufacturing double during this decade, increasing the demand for electrical, civil, and mechanical engineers, but more than one-hundred cities with a population of at least eight thousand doubled their population during this decade as the nation's urban population increased by 56.4 percent.[12] Also, citizen expectations for more and better urban services increased demands on local governments to provide improved and expanded services more than ever before not only in larger cities but in smaller ones too. Now as a matter of course, urban residents throughout the country expected their municipalities to promote cleaner water, a healthier environment, and paved roads.

Having competent engineers proved a must for any city by the twentieth century, whether it had a population of five thousand or five hundred thousand. Indeed, as early as 1894, John C. Olmsted observed that "the city government of today is in a large measure a matter of municipal engineering, and the character of the city's engineer's department is a safe index to the intelligence shown in the development of a municipality. . . . To him [the engineer], even more than to successive mayors, falls the duty of serving the intelligence and brains of municipal government in all physical matters."[13] And one scholar of late-nineteenth-century city engineers suggested they "not only offered solutions to physical problems like water and water supply, but also planning schemes."[14]

A new emphasis on the need for technical expertise dominated the discourse of urban betterment and resulted in a mounting demand for civil engineers who focused on municipal problems. Some cities relied on consultants, but by the 1870s an increasing number of cities hired municipal engineers. Many of those early municipal engineers were not university trained, but the demand for engineers to manage the increasingly complex municipalities changed that. To meet a growing need, land-grant institutions such as Cornell, MIT, and the University of Illinois developed specific courses and in some cases whole curricula in sanitary and municipal engineering.[15] Others soon followed.

By the end of the 1890s, municipal engineering had emerged as a distinctive subfield of civil engineering. The creation of the American Society for Municipal Improvements (later the American Society for Municipal Engineers) in 1894 provided evidence of this new emphasis. Created thanks to the efforts of M. J. Murphy, street commissioner of St. Louis, the organization held its first meeting in Buffalo, which sixty officials from sixteen cities attended. They created an association that brought municipal engineers together to share information about the newest municipal engineering techniques. By the 1916 meeting in Newark, the body had grown to 552 members representing 266 cities.[16] Not only had civil engineers established a national conference on municipal improvements, but engineers in individual states, even those identified as primarily rural, often did the same. For instance, Texas municipal engineers formed their own association "for mutual helpfulness" in 1903. Moreover, Dallas employed enough city engineers that it hosted the American Society for Municipal Improvement as early as 1912.[17]

By this time, the impact of university programs in civil and municipal engineering had become evident. Land-grant universities such as Cornell not only provided engineers for the state of New York but placed municipal engineers throughout the country. By 1923, more than fifty civil engineers from Cornell worked in municipalities as city engineers or sanitary and water engineers. Many ended up in city engineering departments in places such as Honolulu, New York City, Baltimore, Buffalo, Syracuse, Kansas City, San Francisco, Columbus, Rochester, Billings, and Dallas.[18] For instance, Edward A. Wood, a Dallas native and 1908 graduate in civil engineering from Cornell, had worked for St. Louis planner George Kessler as his local representative in Dallas. After Kessler completed a city plan there in 1911, Wood stayed on in Dallas and organized the city's planning office after becoming the first city plan engineer in 1922. Later, he would become the city

[140.254.77.253] Project MUSE (2025-03-29 22:39 GMT) The Ohio State University

engineer of Dallas. During his twenty-three years of city service (besides his earlier work as consultant for the Dallas Chamber of Commerce), he had a profound impact on shaping the physical side of Dallas.[19] He also helped expand the city's engineering department, which explains why Dallas had a higher membership (fifteen) in the American Society for Municipal Improvements than any other city in the state.[20]

The Cornell engineering program also produced the first city highway engineer for Baltimore, an assistant sanitary engineer in Cleveland, a water engineer in Memphis, the chief engineer of the Bureau of Surveys for Baltimore, the harbor engineer of Los Angeles, and the engineer of Bridge Maintenance in Chicago. The program also trained a number of other engineers who took jobs in smaller urban places. During this period, city engineers from Newport News, Virginia; Bethlehem, Pennsylvania; Mount Vernon, Washington; Havre, Montana; Abilene, Texas; and Auburn, Johnston, and Oneonta, New York, held degrees from Cornell's civil engineering program.[21]

The experience of Edward A. Wood also suggests that civil engineers could also use their training to become planners. Indeed, the field of city and regional planning proved another outgrowth of both the civil engineering and architecture programs found in Morrill land-grant institutions. Although Harvard provided the first planning program in 1909, Cornell had offered several courses in architecture, horticulture, and later landscape architecture that touched on planning issues around the same time. And in 1918, Professor Everett Meeks taught a series of lectures in the architecture program on the history of planning and on the design of parks and harbor fronts. Ten years later, Professor William Schuchardt offered a seminar on city planning. By 1935, the board of trustees had appointed a professor of regional planning and, after using a grant from the Carnegie Foundation, offered an increased number of planning courses. Such efforts must have attracted sufficient students since the New York State Board of Regents formally approved a planning program for Cornell in 1941.[22]

Other land-grant colleges also offered planning courses. The University of Illinois introduced planning through the division of landscape architecture (part of the Department of Horticulture) when it hired Charles Mulford Robinson as a professor of civic design. Robinson wasted no time in introducing students to practical planning matters in his first two civic design classes. Students in those two classes investigated physical conditions in Champaign and Urbana and made suggestions on how to improve traffic

circulation, secure open spaces, and address sanitary issues such as water and sewage. They published their findings in 1915 under the title of *Notes for a Study of City Planning in Champaign-Urbana*. The program's planning emphasis gained a boost in 1920 when it hired Harland Bartholomew, who would soon become one of the nations foremost planners.[23] Ten years later, the university finally secured a bachelor of science degree in city planning, and in 1945, the university added a master of city planning degree. By 1954, there were sixteen university planning programs in the United States.[24]

MIT, another one of the original three architecture programs in the nation, also produced a major in city planning and a BA degree in architecture in 1933. The five-year course of study taught undergraduates city planning solutions from a broad perspective, equipping the student "to cooperate intelligently with engineers, landscape architects, lawyers, economists, and sociologists in the planning or replanning of urban areas." Two years later, university officials approved the master of city planning, making it one of four programs at the time that offered a graduate program in city planning.[25] Other Morrill land-grant schools, such as Oregon State University, Iowa State University, Nebraska State, and Kansas State, offered courses in city and regional planning in their engineering schools by 1927.[26]

Although the civil engineering program from another land-grant institution, the Agricultural and Mechanical College of Texas (later Texas A&M University), was much smaller and less recognized nationally than that of Cornell, it too produced a number of civil engineers for the region that helped develop urban infrastructure to promote a more ordered and healthier city. Texas A&M University opened its doors in 1876 and first introduced civil engineering courses through its Department of Mathematics. Indeed, the Department of Applied Mathematics between 1876 and 1879 provided a course of study in general engineering. Students did course work in surveying, descriptive geometry, mechanics, and drawing during their junior year. Seniors studied shades, shadows, and perspective as well as surveying, strength of materials, arches, farming, free-hand drawing, mapping, sketches of tools, and designs for component parts of machines, bridges, and other structures. They also took courses in trigonometry, geometry, and calculus. In 1880, the university awarded a degree in civil engineering to its two graduates.[27]

The Texas A&M University engineering program was relatively small in the late nineteenth century, and university officials did not establish a separate Department of Civil Engineering until 1887.[28] As a result, its largest

graduating class between 1870 and 1900 stood at thirty-one (in 1894).[29] But even then, some of those specializing in civil engineering found work in the state's municipalities. As early as 1902, the department offered courses in city and topographic surveying, city pavements, and sanitary engineering.[30] At this time, small cities now felt compelled to hire city engineers to provide their technical expertise to sewage and water problems, along with a host of others. By 1912, there were thirteen municipal engineers in Texas with degrees from Texas A&M University. Five of those worked for the city of Houston while the city engineer of Dallas and the city engineer of San Antonio also graduated from Texas A&M University with a civil engineering degree. Smaller Texas cities such as Beaumont, Plainview, Cuero, and Cleburne also recognized the importance of hiring university-trained engineers from Texas A&M to provide their technological expertise to solve sewage and water problems, along with a host of others. The city engineer of Muskogee, Oklahoma, also graduated from Texas A&M University.[31] Those not directly employed by cities often became valuable consultants.[32]

Texas urbanization had increased from 27,906 in 1870 to 92,274 in 1880, a 169.2 percent growth rate. Urban migration accelerated in the 1880s as the state's urban population expanded another 138.1 percent. And during the first decade of the twentieth century, city growth increased from 520,759 in 1900 to 938,104 in 1910.[33] Not only did small cities become bigger but towns became small cities. At a time when citizens expected an increase in services and additional public works for their health and safety, engineers, according to one scholar, "offered city governments a corps of individuals skilled in the technology and management of large-scale enterprises, experts who could solve the physical problems of the city."[34]

The demand for capable engineers only increased. For instance in 1916, there were only six sewage disposal plants in the entire state of Texas, but by 1926, that number had risen to 250. The same was true for water purification. In 1916, only three cities in the entire state treated their water, but ten years later, ninety cities employed some water treatment process.[35] Urban residents also demanded more paved roads at this time, another job that civil engineers often oversaw.

Sensitive to the growing demand in Texas for sanitary engineers, Texas A&M followed other land-grant institutions and created a Department of Municipal and Sanitary Engineering in 1924. At the time, it was the only program that gave specialized courses in sanitary engineering in the state. Courses in this major included sewage and sewage disposal, water supply,

[140.254.77.253] Project MUSE (2025-03-29 22:39 GMT) The Ohio State University

sanitary design, as well as sanitation and public health. E. W Steele, a graduate of another land-grant institution, Cornell University, developed the new program at A&M and initially offered it only to graduate students. But that changed the following year, when the department allowed seniors to take classes in sanitary and municipal engineering. In June 1926, it graduated the first class of sanitary engineers for the state of Texas. Three of the first nine graduates were offered jobs in the Fort Worth Board of Public Health while the Texas Board of Health planned to hire several others to assign them to various city departments. Although the Department of Municipal and Sanitary Engineering focused on equipping students to become municipal and sanitary engineers, it also offered course work to train students to become city managers.[36]

Even before the creation of the major in sanitary and municipal engineering, Texas A&M's civil engineering program had already produced city managers including Hal Moseley, who graduated from the program in 1901. After spending much of his early career as the city engineer for Austin, he moved to Dallas, where he first became city engineer and later the director of Public Works. Dallasites elected him street commissioner in 1919, a position that perfectly fitted his training at Texas A&M since he oversaw streets and bridges, street cleaning, garbage removal, street improvements, and the safety of the city's water supply at White Rock Lake.[37] After a short period in private practice as a consultant, he accepted the council's appointment to become the city's second city manager in 1935, a position he held for the next four years. The man who succeeded Moseley as city manager, twenty-seven-year-old James Aston, had also graduated from the Texas A&M University civil engineering program and had previously served as city manager at Bryan, Texas, before coming to Dallas.[38] Such a pattern was not unique to Dallas. According to the *Municipal Yearbook*, 48 percent of the membership in the City Managers Association as early as 1919 had been trained as engineers.[39] A major survey of city engineers in 1940 found that sixty-three held degrees in civil engineering. At Texas A&M, one of the first graduates from the engineering program's department of architecture in 1905, later went on to became city manager of Sacramento, California.[40]

Land-grant colleges not only contributed to urban growth and development in this country by training many civil engineers, but they also established engineering experiment stations. Although the Hatch Act had funded agricultural experiment stations since 1887, the federal government never created a similar support for engineering experiment stations even

though Congressman Eugene Hale attempted to secure legislative approval for such a program in 1896.[41] Despite this setback, the Board of Trustees of the University of Illinois launched an engineering experimental station on December 8, 1903. Faculty members were encouraged to engage in research using the station's graduate and research assistants as well as its special investigators. Engineers published their research findings in the *Bulletin* of the engineering experiment station. By 1930, the Illinois Engineering Experiment Station had issued more than 220 issues of the *Bulletin*. Although many of these were on technical issues unrelated to cities, others focused on projects directly linked to urban America with titles such as "Street Lighting" (1911), "Wind Stresses in the Steel Frames of Office Buildings" (1915), "Tests to Determine the Rigidity of Riveted Joints of Steel Structures" (1917), and "Some Conditions Affecting the Usefulness of Iron Oxide for City Gas Purification" (1921).[42] The following year, Iowa State University also established an engineering experiment station, and one of its explicit purposes was to "assist the urban population of the state in solving technical problems of urban life."[43] It too published a bulletin on a regular basis.

Soon other colleges copied these efforts including the land-grant institutions of Pennsylvania College (later Pennsylvania State University), University of Missouri, Kansas State Agricultural College (later Kansas State University), and Texas A&M. At the latter school, faculty founded the Texas Engineering Experiment Station in 1913, only ten years after the University of Illinois had become the first land-grant university in the nation to do so.[44]

By 1924, twenty-nine land-grant colleges had created engineering experiment stations with 110 full-time and 358 part-time staff. Those stations had issued 503 engineering research bulletins and secured $663,456 in research funds. Although much of the focus of these stations centered on rural needs as well as manufacturing challenges, some of the bulletins published research on municipal problems such as building, pavement, parking, sewage disposal, and infrastructure issues. And a few of these such as the engineering experimental stations at Iowa State University and Texas A&M University specified a goal of "solving the technical problems of urban life."[45]

Although the Illinois experiment station seemed preoccupied with steel frame buildings, the Texas A&M station was most interested in the development and maintenance of roads. Both, however, like the other engineering experimental stations, were committed to sharing "important information to the general public through printed bulletins." A majority of the bulletins issued by Texas A&M dealt with the development and maintenance of roads.

Indeed, seventeen of the first twenty-five issues of the *Bulletin* addressed this topic focusing on the need for better roads for rural travel.[46] By 1919, the Texas experiment station turned its attention to its state's municipalities and devoted three issues to pavement selection in Texas cities. The first bulletin on the pavement needs of Texas municipalities, issued in 1919, focused on the existing bituminous pavements in a number of Texas cities. It attempted to understand why certain bituminous pavements were better than others. Since local conditions affected the success of bituminous pavement, this study examined bituminous pavement in seven Texas cities in an attempt to identify the best way to produce the most successful pavement using the local materials available throughout the state of Texas.[47] The data assembled and analyzed in this sixty-two–page report proved incomplete since the principle investigator left the university after writing up his findings on one type of bituminous pavement (Bitulithic) and not others such as asphaltic concrete, sheet asphalt, Uvalde rock asphalt, and Oklahoma rock asphalt. This necessitated part two of the report published in September 1921.[48] This report summarized the strengths and weakness of each of the bituminous pavements, an important contribution to city officials wanting to get the best pavement for their dollar.

Another *Bulletin* published in 1920, titled "Principals of Pavement Selection," provided significant information on the various types of pavements used by cities and towns throughout Texas. As it had done with the bituminous study, this investigation collected valuable data and provided helpful information for city officials wishing to secure the best type of pavement for their money. Such a study also allowed engineers to identify the most effective pavements for their city's needs.[49]

Later urban topics covered by issues of the *Bulletin* included bridges and highways, sewers, air conditioning, and urban parking problems. In addition, one issue printed the proceedings of an annual short course in Highway Engineering offered by the engineering department of Texas A&M University. Another *Bulletin* issue included the *Proceedings of the First and Second Annual Conferences of [Texas] Municipal Engineers*.[50] The Municipal and Sanitary Engineering Department of Texas A& M sponsored these two conferences because faculty agreed with city officials that "city engineers, street superintendents, planning engineers and other city officials engaged in municipal work" should meet and interchange ideas. This gathering of municipal engineers took place in College Station, home of Texas A&M University.[51] The engineering station also undertook public school building research in

[140.254.77.253] Project MUSE (2025-03-29 22:39 GMT) The Ohio State University

cooperation with the Architectural Department and promoted sanitary engineering research as well as provided industrial surveys of Texas.

Later on, some land-grant institutions developed engineering extension services for their state.[52] Although often underfunded, these services frequently benefitted the state's urban as well as rural constituencies.

Land-grant institutions also helped shape the modern metropolis thanks to their architectural students' efforts. Just as it had in engineering, the professionalization of the field of architecture created a demand for more colleges to offer the degree, a demand that the Morrill land-grant colleges helped fill. Architects played a critical role in the emerging "new city" of the turn of the century. At no time had the physical landscape of urban America changed so drastically as it had between 1880 and 1920. The rapid population growth thanks to industrialization and the emergence of the modern downtown, encouraged by the street car and railroad, created the context for the new city to emerge. But access to new building materials and innovative building techniques demanded increased technical expertise and forever shaped the cityscape of urban America. Whether it was steel frame skyscrapers or electric switching stations, architects profoundly shaped the modern city. Major firms across the nation dominated this aspect of city building and although they were often known by the names of one or two architects, these firms provided jobs for hundreds, if not thousands, of architects, including those freshly minted with college degrees in architecture. These large offices, along with smaller firms would have not been possible without the increase in university-trained architects. Early programs in architecture often came out of engineering, and indeed architectural engineering remained a distinct field. That program focused on planning, design, construction, and operation of engineered systems for buildings and emphasized the construction part of architecture rather than design. Many schools offered degrees in both construction and design, since the two remained important for the future of city development.

As had been the case with engineering, land-grant universities played a critical role in the development of college-trained architects. Indeed, Morrill land-grant colleges produced the first three American schools of architecture. According to one scholarly account, these programs "established the collegiate pattern and inclusive character of architectural education in the United States."[53] MIT offered a two-year program in design, construction, and professional practice that started in September 1868. Sixteen months later, the Illinois Industrial University (later University of Illinois) initiated

its own architectural program. Cornell University, founded in 1865, became the first college to offer a four-year course of study in architecture and established what is generally conceded as the first college department in architecture. By 1873, all three schools had graduated students who had majored in architecture.[54] The number of architectural programs increased to twenty-seven by 1912, many of which were established at land grant institutions.

It is not an accident that the University of Illinois overtook MIT in having the largest enrollment of architectural students in the nation by 1896. As Chicago experienced spectacular growth in the late nineteenth and early twentieth centuries, and as the demand for housing, manufacturing plants, and office buildings rose exponentially, many students flocked to the University of Illinois to learn the skills necessary to create a new cityscape. Indeed, in 1896, Illinois enrolled 25 percent of the 273 regular students attending American architectural schools at that time.[55]

Despite large program architectural programs at MIT and Illinois, the Morrill Land-Grant Act helped diffuse collegiate architectural programs throughout the nation. For instance, the Agricultural and Mechanical College of Alabama (later Auburn University), a land-grant college, offered the first degree in architecture in the deep South starting in 1907, and the Agricultural and Mechanical College of Texas (later Texas A&M University), another land-grant school, offered a course in architectural engineering in 1905 that stressed the engineering aspects of architecture, paying little attention to design. Indeed, the first architecture effort grew out of a newly established Department of Architectural Engineering and Drawing. Students wanting this degree were required to take the same courses as civil engineering students their first two years and then take architecture-related courses their final two years. Ten students enrolled in the 1905–1906 school year and three graduated with the first degree in architecture in Texas in June 1906.[56]

Friedrich Ernst Giesecke served as the first administrator of the Architecture Department at Texas A&M. The architectural engineer had received a BS in mechanical engineering from this school in 1886 and then joined the faculty shortly after graduation. While at Texas A&M, he took additional course work in architectural drawing at Cornell College and later received a degree in architecture from MIT in 1904. He left A&M in 1912 to develop the University of Texas's architectural program and stayed there until he returned to Texas A&M in 1927. While at the University of Texas, he had also earned a PhD from the University of Illinois.[57] After Giesecke's initial

departure in 1912, the A&M program expanded course offerings and became a more traditional architectural department. Not only did it broaden its architectural focus, but it attracted more students.

In 1912, forty-two had enrolled and six graduated with a BS degree in architectural engineering. Starting in 1914, the college established a full four-year program solely in architecture that provided students an option to specialize in either architectural engineering or architecture—the latter having a greater emphasis on design. That program immediately became the most popular. By 1924, 140 students were enrolled in the architecture program, and all of the graduates that year had taken the BS in architecture track.[58]

In California, the University of California, a Morrill land-grant school, established the state's first architectural program in 1904 and housed it in the College of Liberal Arts. Other western states with only one architectural program as late as 1930 included Oregon, Idaho, North Dakota, and Montana, all created at Morrill land-grant institutions. For many years, the land-grant institutions in the Midwest, South, and Southwest were usually the only schools in those states that offered architecture programs.[59] As late as 1930, the Association of Collegiate Schools of Architecture found that twenty-three of the nation's fifty-two schools were Morrill land-grant institutions. Even more important, of the eighteen programs found west of the Mississippi in this rapidly urbanizing region, twelve had been founded at land-grant institutions.[60] In addition, the only architectural schools located in five deep South states were found at Morrill land-grant universities.[61] Land-grant institutions, then, democratized architectural education, making it possible for good students not having the resources for private eastern schools to receive educational opportunities and degrees in architecture nearer their home. Because of land-grant universities, more students than ever before had the chance to pursue a career in architecture. For instance, those in Oklahoma wanting an architectural degree did not have to go to Harvard or Yale in 1912 and pay between $315 to $400 in tuition per year. Rather they could attend their state's Land-grant institution, Oklahoma Agricultural and Mechanical College (today Oklahoma State University), for $10 per year for tuition and fees. Nor did Texans in a rapidly urbanizing state have to travel to St. Louis to pursue architecture at Washington University and pay $266 in tuition and fees annually when they could attend Texas A&M University for $50 per year.[62] Of course not all students proved to be successful in their quest. Although 140 students were enrolled in the architecture program at A&M in 1924, only 13 graduated that year.[63]

[140.254.77.253] Project MUSE (2025-03-29 22:39 GMT) The Ohio State University

Despite such graduation rates, it is important to remember that along with increasing opportunity at a time that technical expertise and credentialing were becoming very important, the Morrill Land-Grant Act had a significant impact on the development of urban America. The higher educational system created by the Morrill Land-Grant Act of 1862 provided unprecedented educational opportunities and training in response to metropolitan needs. Land-grant engineering experiment stations also publicized urban problems and shared solutions. Indeed they often became a clearinghouse of information for officials and the city's bureaucracy needing technical assistance. At a time when urban residents expected more from their cities than ever before, land-grant colleges provided the necessary technical expertise desired by the nation's rapidly growing cities. Such a chapter in the history of the Morrill Land-Grant Act of 1862 deserves more attention from historians that it has received so far.

Notes

1. World Cat listed eighty-two entries under "Morrill Land Grant Act" as of November 4, 2014.

2. See for instance Roger L. Williams, *The Origins of Federal Support for Higher Education: George W. Atherton and the Land-Grant College Movement* (University Park: Pennsylvania State University Press, 1991); Joseph Bailey Edmond, *The Magnificent Charter: The Origin and Role of the Morrill Land-Grant Colleges and Universities (*Hicksville, N.Y.: Exposition Press, 1978); Edward Danforth Eddy, *Colleges for Our Land and Time; The Land-Grant Idea in American Education*. (Westport, Conn.: Greenwood Press, 1973); Edward Danforth Eddy, Jr., *Colleges of Our Land and Time: The Land-Grant Idea in American Education* (New York: Harper & Brothers, 1957).

3. S. E. Morison and H. S. Commager, *The Growth of the American Republic*, 3rd ed., vol. 2 (New York: Oxford University Press, 1942), 196.

4. For example, see Eric H. Monkkonen, *America becomes Urban: The Development of US Cities and Towns, 1780–1980* (Berkeley: University of California Press, 1988), 89–222. For another study that emphasizes the importance of the changing definition of what cities are and what they should do, see Alan I Marcus, *Plague of Strangers: Social Groups and the Origins of City Services in Cincinnati* (Columbus: Ohio State University Press, 1991).

5. Quote from Stanley K. Schultz and Clay McShane, "To Engineer the Metropolis," *Journal of American History* 65 (September 1978): 407. Also see Jon C. Teaford, *The Unheralded Triumph: City Government in America, 1870–1900* (Baltimore: Johns Hopkins University Press, 1984); Stanley K. Schultz, *Constructing Urban Culture: American Cities and City Planning, 1800–1920* (Philadelphia: Temple University Press, 1989);

Martin V. Melosi, *The Sanitary City: Urban Infrastructure in Urban America from Colonial Times to the Present* (Baltimore: Johns Hopkins University Press, 2000).

6. Eddy, Jr., *Colleges of Our Land and Time*, 122.

7. Terry S. Reynolds. "The Engineer in 19th Century America," in *The Engineer in America: A Historical Anthology from Technology and Culture*, ed. Terry S. Reynolds (Chicago: University of Chicago Press, 1991), 16; Lawrence P. Grayson, *The Making of an Engineer: An Illustrated History of Engineering Education in the United States and Canada* (New York: John Wiley & Sons, 1991), 22.

8. Reynolds, "Engineer in 19th Century America," 20.

9. William E. Wickenden, *A Comparative Study of Engineering Education in the United States and Europe*, Bulletin 16 of the Investigation of Engineering Education (Lancaster, Pa.: Lancaster Press, Inc., 1929), 68.

10. Ibid., 69.

11. By 1900, it was the second largest profession in America. Martin V. Melosi, *Garbage in the Cities: Refuse, Reform, and the Env*ironment, rev. ed. (Pittsburgh: University of Pittsburgh Press, 2005), 70; Morris Bishop, *A History of Cornell* (Ithaca: Cornell University Press, 1962), 107, 400–01; Reynolds. "The Engineer in 19th Century America," 21.

12. Raymond A. Mohl, *The New City: Urban America in the Industrial Age, 1860–1920* (Arlington Heights, Ill.: Harlan Davidson, Inc., 1985), 16.

13. John C. Olmsted, "The Relationship of the City Engineer to Public Parks," *Journal of the Association of Engineering Societies* 13 (October 1894): 594–595.

14. Stanley K. Schultz and Clay McCone, "To Engineer the Metropolis," *Journal of American History* 65 (September 1978): 401.

15. Melosi, *Garbage in the Cities*, 73.

16. *Proceedings of the Second Annual Convention of the American Society for Municipal Improvements Held in Cincinnati, Ohio, September 11, 12, and 13, 1895* (Cincinnati: Commercial Gazette Job Print, 1895), 6; Melosi, *Garbage in the Cities*, 78.

17. "Municipal Engineers of Texas Have Decided to Form an Association for Mutual Helpfulness," *Municipal Journal and Engineer* 15 (September 1903): 115; "City Engineers Open Convention," *Dallas Morning News*, November 13, 1912, 2.

18. Data was collected from "Members of the Association of Civil Engineers Cornell University: All Graduates of the College of Civil Engineering up to and Including 1923," 31, in *Cornell Civil Engineer*, June 23, 1923, 110–133.

19. Robert B. Fairbanks, *For the City as a Whole: Planning, Politics, and the Public Interest in Dallas, 1900–1965* (Columbus: Ohio State University, 1998), 45; William N. Black, "Empire of Consensus Building: City Planning, Zoning, and Annexation in Dallas, 1900–1960," PhD diss., Columbia University, 1982), 81–82. "Maj. E. A. Wood Retires as City Plan Engineer," *Dallas Morning News*, October 30, 1955, 2.

20. "Municipality Improvements Meet Subject," *Dallas Morning News*, November 14, 1927, 2.

21. Data was collected from "Members of the Association of Civil Engineers Cornell

University." Since this list just identifies living alumni, I also looked at earlier Cornell Alumni News found in the *Cornell Civil Engineer.*

22. Cornell Planning History, The Early Years, accessed September 17, 2013, http://aap.cornell.edu/crp/history/.

23. "Classes in Civic Design, University of Illinois," *Notes for a Study in City Planning in Champaign-Urbana* (Chicago: R. R. Donnellery and Sons Company, 1915), 5, 21–37.

24. Department of Urban and Regional Planning, "100 Years at Illinois, Department Milestones," accessed August 28, 2013, http://urban.illinois.edu/100th/department-milestones.html.

25. MIT City Planning Website, "SA+P History," accessed August 19, 2013, http://sap.mit.edu/about/history/; Mel Scott, *American City Planning since 1890: A History Commemorating the Fiftieth Anniversary of the American Institute of Planners* (Berkeley: University of California Press, 1969), 365.

26. John Nolen, "Twenty Years of City Planning Progress in the United States," *Planning Problems of Town, City and Region. Papers and Discussions at the 19th National Conference on City Planning Held at Washington, D.C., May 9 to May 11, 1927* (Philadelphia: William F. Fell Co., 1927), 13.

27. Henry C. Dethloff, *A Centennial History of Texas A&M University, 1876–1979,* vol. 1 (College Station: Texas A&M University Press, 1975), 246.

28. "Reflections on More than 124 Years of Civil Engineering History at Texas A&M University," accessed November 1, 2014, http://engineering.tamu.edu/civil/about/history.

29. *Annual Catalogue, Session 1920–1921, Agricultural and Mechanical College of Texas, College Station Texas,* 3rd series, vol. 7 (Austin: State Printing Co., 1921), 268.

30. *Annual Catalogue, Session 1902–1903, Agricultural and Mechanical College of Texas, College Station Texas* (Austin: State Printing Co., 1903), 44–46.

31. *27th Annual Catalogue, Session 1905–1906, Agricultural and Mechanical College of Texas, College Station Texas* (Austin: State Printing Co., 1906), 252–253.

32. Teaford, *Unheralded Triumph*, 133. Teaford not only notes the appearance of numerous civil engineers in city government but suggests their longevity in office brought a certain stability to local government that was missing in other places.

33. Char Miller and David R. Johnson, "The Rise of Urban Texas," in *Urban Texas: Politics and Development*, eds. Char Miller and Heywood T. Sanders (College Station: Texas A&M University Press, 1990), 8.

34. Schultz, *Constructing Urban Culture*, 189.

35. "Speech by V. M. Ehlers," *Bryan-College Station Eagle*, March 6, 1926. The statistics are from V. M. Ehlers, state sanitary engineer. Newspaper Clipping File a, General Folder, College of Engineering, Cushing Memorial Library and Archives, Texas A&M University, College Station, Texas.

36. *Bryan-College Station Eagle*, September 17, 1925, and May 21, 1926, Newspaper Clipping File. College of Engineering, Cushing Memorial Library and Archives, Texas A&M University, College Station, Texas.

[140.254.77.253] Project MUSE (2025-03-29 22:39 GMT) The Ohio State University

37. *27th Annual Catalogue, Session 1905–1906, Agricultural and Mechanical College of Texas, College Station Texas* (Austin: State Printing Co., 1906); *Dallas Morning News*, September 27, 1911, May 21, 1915, April 18, 1919.

38. *Steam* 29 (January 1922): 21; Fairbanks, *For the City as a Whole,* 100, 123.

39. Schultz and McShane, "To Engineer the Metropolis," 410.

40. "Department of Architecture to be Reclassified as a Division Effective September 1, 1956," Bryan-College Station *Eagle*, October 2, 1955.

41. Grayson, *Making of an Engineer*, 82.

42. J. B. Bryant and H. G. Hake, "Street Lighting," *University of Illinois Engineering Bulletin* No. 51, (December 1911); W. M. Wilson, "Wind Stresses in the Steel Frames of Office Buildings," *University of Illinois Engineering Bulletin No. 80* (June 1915); Wilbur M. Wilson and Herbert F. Moore, "Tests to Determine the Rigidity of Riveted Joints of Steel Structures," *University of Illinois Engineering Bulletin No. 104* (December 1917); William A. Dunkley, "Some Conditions Affecting the Usefulness of Iron Oxide for City Gas Purification," *University of Illinois Engineering Bulletin No. 119* (February 1921).

43. Quote from "Purpose of the Station" found in *Engineering Experiment Station, Bulletin No. 29* (December 1912), inside front cover. (This bulletin is affiliated with Iowa State College of Agriculture and Mechanic Arts.)

44. Grayson, *Making of an Engineer, 82.*

45. Ibid. *Bulletin of the Agricultural and Mechanical College of Texas*, 3rd series, vol. 7 Annual Catalogue, Session 1920–1921, Agricultural and Mechanical College of Texas, College Station Texas (Austin: State Printing Co., 1921), 245.

46. *Bulletin of the Agricultural and Mechanical College of Texas*, 3rd series, vol. 8, (October 1, 1922), "List of Bulletins Issued by the Texas Engineering Experiment Station," back cover, accessed February 17, 2014, http://books.google.com/books?id=8stMAAAAYAAJ&pg=RA5-PA49&lpg=RA5-PA49&dq=Texas+Engineering++Experiment+Station+NO.+2&source=bl&ots=2D8OcdJ3Xc&sig=55OORqa8OvaDqE_4ceywm80vYxQ&hl=en&sa=X&ei=FJObUefZJMqLrAGwoICgDg&ved=0CG8Q6AEwCA.

47. Roy M. Green, "Bituminous Pavement Investigations in Central Texas Cities," *Texas Engineering Experiment Station Bulletin 22* (May 1919): 3, 7.

48. Roy M. Green, "Bituminous Pavement Investigations in Certain Texas Cities. Part II. Asphaltic Concrete (Topeka and Modified Topeka), Sheet Asphalt, Uvalde Rock Asphalt, and Oklahoma Rook Asphalt," *Texas Engineering Experiment Station Bulletin 24* (September 1921): 3.

49. Roy M. Green and L. W. Kemp, "Principles of Pavement Selection with Statistics of Pavements in Texas Cities and Towns Prior to January 1, 1920," *Texas Engineering Experiment Station Bulletin 23* (May 1920): 7.

50. *Bulletin of the Agricultural and Mechanical College of Texas*, 3rd series, vol. 7 Annual Catalogue, Session 1920–1921, Agricultural and Mechanical College of Texas, College Station Texas (1921), 245; *Bulletin of the Agricultural and Mechanical College of Texas*, 4th series, vol. 12 (1941), back cover; and *Bulletin of the Agricultural and*

Mechanical College of Texas, 5th series, vol. 5 (1949), 5. All published in Austin by the State Printing Co.

51. Foreword, *Bulletin of the Agricultural and Mechanical College of Texas*, 4th series, vol. 12, 5.

52. "Serving Texas Agriculture and Industry: The Texas A&M College System," *Dallas Morning News*, July 18, 1948, 13.

53. Turpin C. Bannister, ed., *The Architect at Mid-Century: Evolution and Achievement*, vol. 1 *of Report of the Commission for the Survey of Education and Registration of the American Institute of Architects* (New York: Reinhold Publishing Company, 1954), 96.

54. Bishop, *A History of Cornell*, 160–161; Bannister, *Architect at Mid-Century*, 96–97.

55. Winton U. Solberg, *The University of Illinois 1867–1894* (Urbana: University of Illinois Press, 1968), 263.

56. Ernest Langford, *A Brief History of the Division of Architecture from September 1, 1905 to August 31, 1956* (College Station: College Archives, Agricultural and Mechanical College of Texas, 1957), 1–3; Arthur Clason Weatherhead, "The History of Collegiate Education in Architecture in the United States" (PhD diss., Columbia University, 1941), 34, 62–65, 114–115, 120–121, 124. Clipping, *The Eagle*, October 2, 1955, College of Architecture Collection, 1906–1990, box 1, Special Subjects Back files, folder, College of Architecture, University Archives, Texas A&M University, College Station, Texas.

57. Langford, *A Brief History of the Division, 4*; Weatherhead, "History of Collegiate Education in Architecture,"123; College of Architecture, "History: A Century of Excellence," specifically "The Foundation: Our First 50 Years," accessed, September 29, 2013, http://www.arch.tamu.edu/inside/history/.

58. Ibid., 9, 34.

59. Joan Ockman, ed., *Architecture School: Three Centuries of Education Architects in North America* (Cambridge: MIT Press, 2012), 18–19; Marcus Brown, "The Morrill Land Grant Act of 1862 and Foundations of the University of Kentucky," accessed September 20, 2013, http://libraries.uky.edu/libpage.php?lweb_id=336&llib_id=13; Weatherhead, "History of Collegiate Education in Architecture," 113–115.

60. F. H. Bosworth, Jr., and Roy Childs, *A Study of Architectural Schools* (New York: Charles Scribner's Sons, 1932), 190–191.

61. The five states were Florida, Alabama, South Carolina, North Carolina, and South Carolina. Ibid.

62. Weatherhead, "History of Collegiate Education in Architecture,"190, 192.

63. Langford, *A Brief History of the Division*, 34.